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EXAMINER
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ART UNIT	PAPER NUMBER
1634	6

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/868,043	Caillat
Examiner	**Art Unit**
Arun Chakrabarti	1655

-- **The MAILING DATE of this communication appears on the cover sheet with the correspondence address** --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- *Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.*
- *If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.*
- *If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.*
- *Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).*
- *Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).*

Status

1) ☒ *Responsive to communication(s) filed on 6/14/01, 7/27/01, 10/9/01 and 10/24/01 .*

2a) ☐ *This action is* **FINAL.** 2b) ☒ *This action is non-final.*

3) ☐ *Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.*

Disposition of Claims

4) ☒ *Claim(s) 1-26 is/are pending in the application.*

4a) *Of the above, claim(s) _____ is/are withdrawn from consideration.*

5) ☐ *Claim(s) _____ is/are allowed.*

6) ☒ *Claim(s) 1-26 is/are rejected.*

7) ☐ *Claim(s) _____ is/are objected to.*

8) ☐ *Claims _____ are subject to restriction and/or election requirement.*

Application Papers

9) ☐ *The specification is objected to by the Examiner.*

10) ☐ *The drawing(s) filed on _____ is/are objected to by the Examiner.*

11) ☐ *The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.*

12) ☐ *The oath or declaration is objected to by the Examiner.*

Priority under 35 U.S.C. § 119

13) ☒ *Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).*

a) ☐ *All* b) ☐ *Some** c) ☒ *None of:*

1. ☒ *Certified copies of the priority documents have been received.*
2. ☐ *Certified copies of the priority documents have been received in Application No. _____ .*
3. ☐ *Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).*

**See the attached detailed Office action for a list of the certified copies not received.*

14) ☐ *Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).*

Attachment(s)

15) ☒ *Notice of References Cited (PTO-892)*

16) ☐ *Notice of Draftsperson's Patent Drawing Review (PTO-948)*

17) ☒ *Information Disclosure Statement(s) (PTO-1449) Paper No(s).* 4 and 5

18) ☐ *Interview Summary (PTO-413) Paper No(s). _____*

19) ☐ *Notice of Informal Patent Application (PTO-152)*

20) ☐ *Other:*

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 3, 8, 10, 19 and 24, the phrase "capable of" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention

Regarding claims 5 and 21, the phrase "for example" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim 1 recites the limitation "said substrate microtrough" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim 20 is rejected over the limitation of the phrase, “et” in line 18. It is not clear if a new cross-linking reagent named “et” is claimed or how “et” is involved in the cross-linking

reaction of pyrrole with oligonucleotides. The metes and bounds of the claims are vague and indefinite.

Claim 21 recites the limitation "the base" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-5, 10-14, 16-17, 19, 20, and 24-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Teoule et al. (U.S. Patent 5,837,859) (November 17, 1998).

Teoule et al teach a method to produce a blank biochip (Figures 4A-B), characterized in that it comprises the following steps:

a) structuring of a substrate so as to obtain on the substrate microtroughs comprising in their base a layer of a material capable of initiating and promoting the adhesion onto the layer of a film of a pyrrole and functionalized pyrrole copolymer by electropolymerisation (Column 4, lines 21-33 and Figures 4A-B and Example 4),

b) collective electropolymerisation, so as to form an electropolymerised film of a pyrrole and functionalized pyrrole copolymer on the base of the microtroughs, on the layer of the

material, using a pyrrole and functionalized pyrrole solution, in the presence of a suitable chemical reagents for the electropolymerization (Column 4, lines 34-43 and Example 4), and

c) of direct or indirect fixation of a biological probe onto the functioinalized pyrrole, by injecting a biological probe solution, either in one or more microtroughs in the presence of chemical reagents required for the direct or indirect fixation of this biological probe onto the finctionalized pyrrole (Examples 1-5).

Teoule et al teach a method, wherein the layer of material capable of initiating and promoting the adhesion of the polypyrrole film by electropolymerisation being a metallic layer of gold, step a) comprises a deposition step of the metallic layer onto the substrate, and a deposition step of a layer of resin or polymer onto the metallic layer and engraving of the resin layer so as to form microtroughs, wherein the base is composed at least partly of the metallic layer (Column 5, lines 8-34).

Teoule et al teach a method, wherein step a) also comprises a chemical treatment step of the gold layer at the base of the microtoughs in the presence of a functionalized pyrrole for example with a thiol group so as to form a monolayer of pyrrole onto the gold layer, at the base of the microtoughs (Examples 6-7).

Teoule et al teach a method, wherein the collective electropolymerisation is carried out by immersing the structured substrate obtained in step a) in an electrolytic bath comprising a solution of pyrrole, functionalized pyrrole, and suitable chemical reagents for electropolymerisation, in the presence of a counterelectrode which is immersed in the electrolytic

bath and is independent of the structured substrate, the layer of material capable of initiating and promoting the adhesion onto the layer of the pyrrole and functionalized pyrrole copolymer film forming a working electrode (Example 2- Principle of the technique and Method Section).

Teoule et al teach a method, wherein the functionalized pyrrole is a pyrrole comprising a group chosen in a set comprising an NH2 group (aminoethyl pyrrole in this case) (Example 4 and Figures 7-8).

Teoule et al teach a method, wherein the fixation of the biological probe being indirect, the method also comprises, in step c) before the fixation of the biological probe, a collective fixation of a cross-linking agent on the functionalized pyrrole, in the presence of suitable chemical reagents, the cross-linking agent comprising a first function enabling its fixation onto the functionalized pyrrole, and a second function enabling the fixation of the biological probe on the cross-linking agent (Example 4).

Teoule et al teach a method, wherein the cross-linking agent is chosen from a diacid (dichloromethane in this case) (Examples 4 and 7).

Teoule et al teach a method, wherein the biological probe is a functionalized oligonucleotide to be fixed either directly or indirectly onto a functionalized pyrrole (Examples 1-5).

Teoule et al teach a blank biochip comprising in this order:

- a substrate,

- a layer of material capable of initiating and promoting on the layer the adhesion of a film of pyrrole and functionalized pyrrole copolymer by electropolymerisation,

- a layer of resin coating the layer of material capable of initiating and promoting the adhesion on the layer of a film of pyrrole and functionalized pyrrole coplymer, wherein microtroughs have been produced such that the base of the microtroughs is composed at least partly of the layer of the materials,

- a layer of pyrrole and functionalized pyrrole coplymer, fixed on the material composing the base of the microtoughs (Example 4).

Teoule et al teach a biochip comprising in this order:

- a silica substrate (Column 1, lines 12-13 and Column 6, lines 8-10),

- a gold layer comprising pyrrole sites (Column 5, lines 1-12),

- a resin layer coating the gold layer comprising pyrrole sites, wherein microtroughs have been produced such that the base of the microtroughs is composed at least partly of the gold layer comprising pyrrole sites (Column 5, lines 1-17),

- a layer of pyrrole and functionalized pyrrole coplymer, fixed on the gold layer comprising pyrrole sites composing the base of the microtroughs, the functionalized pyrrole being bound to a bi-functional cross-linking reagent (Column 5, lines 61-64),

- an oligonucleotide fixed directly on the functionalized pyrrole, or indirectly on the functionalized pyrrole by means of the crosslinking agent bound to the pyrrole (Column 5, line 64 to column 6, line 24).

5. Claims 1-3, 7, 8, 19, 20 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Livache et al. (Biosensors and Bioelectronics, (1998), Vol. 13, pages 629-634).

Livache et al. teach a method to produce a blank biochip (Abstract), characterized in that it comprises the following steps:

a) structuring of a substrate so as to obtain on the substrate microtroughs comprising in their base a layer of a material capable of initiating and promoting the adhesion onto the layer of a film of a pyrrole and functionalized pyrrole copolymer by electropolymerisation (Abstract, Materials and Methods Section),

b) collective electropolymerisation, so as to form an electropolymerised film of a pyrrole and functionalized pyrrole copolymer on the base of the microtroughs, on the layer of the material, using a pyrrole and functionalized pyrrole solution, in the presence of a suitable chemical reagents for the electropolymerization (Abstract, Materials and Methods Section), and

c) of direct or indirect fixation of a biological probe onto the functioinalized pyrrole, by injecting a biological probe solution, either in one or more microtroughs in the presence of chemical reagents required for the direct or indirect fixation of this biological probe onto the finctionalized pyrrole (Abstract, Materials and Methods Section),

Livache et al. teach a method, wherein the layer of material capable of initiating and promoting the adhesion of the polypyrrole film by electropolymerisation being a metallic layer of gold, step a) comprises a deposition step of the metallic layer onto the substrate, and a deposition step of a layer of resin or polymer onto the metallic layer and engraving of the resin layer so as to

form microtroughs, wherein the base is composed at least partly of the metallic layer (Abstract, Materials and Methods Section and Figures 1-3),

Livache et al. teach a method, wherein the substrate is a silicon insert (Figure 1 and Materials and Methods Section).

Livache et al. teach a blank biochip comprising in this order:

- a substrate,

- a layer of material capable of initiating and promoting on the layer the adhesion of a film of pyrrole and functionalized pyrrole coplymer by electropolymerisation,

- a layer of resin coating the layer of material capable of initiating and promoting the adhesion on the layer of a film of pyrrole and functionalized pyrrole coplymer, wherein microtroughs have been produced such that the base of the microtroughs is composed at least partly of the layer of the materials,

- a layer of pyrrole and functionalized pyrrole coplymer, fixed on the material composing the base of the microtoughs (Abstract, Materials and Methods Section and Figures 2-3),

Livache et al. teach a biochip comprising in this order:

- a silica substrate (Abstract, Materials and Methods Section, Silicone subsection, and Figures 2-3),

- a gold layer comprising pyrrole sites (Results and Discussion Section, Use of different silicon chips Subsection),

- a resin layer coating the gold layer comprising pyrrole sites, wherein microtroughs have been produced such that the base of the microtroughs is composed at least partly of the gold layer comprising pyrrole sites (Materials and Methods Section, Silicon Chips Subsection),

- a layer of pyrrole and functionalized pyrrole coplymer, fixed on the gold layer comprising pyrrole sites composing the base of the microtroughs, the functionalized pyrrole being bound to a bi-functional cross-linking reagent (Materials and Methods Section, Silicon Chips Subsection and Polymer Copolymer synthesis Subsection).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CAR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-6, 10-14, 16-17, 19, 20, 21, 22, and 24-26 are rejected under 35 U.S.C. 103(a) over Teoule et al. (U.S. Patent 5,837,859) (November 17, 1998) in view of Livache et al. (Nucleic Acids Research, (1994), Vol. 22 (15), pages 2915-2921).

Teoule et al teach the method of claims 1-5, 10-14, 16-17, 19, 20, and 24-26 as described above.

Teoule et al do not teach the method, wherein functionalized pyrrole with a thiol group has the formula of claim 6, wherein n has a value ranging from 2 to 10.

Livache et al. teach the method, wherein functionalized pyrrole with a thiol group has the formula of claim 6, wherein n has a value equal to 1 (MATERIALS and METHODS Section, Synthesis of pyrrole modified phosphoramidite Subsection).

"Compounds which are position isomers (compounds having the same radicals in physically different positions on the same molecules) or homologs (compounds differing regularly by the successive addition of the same chemical group, e.g., by -CH 2- groups) are generally of sufficient close structural similarity that there is a presumed expectation that such compounds possess similar properties. *In re wilder,* 563 F.2D 457, 195 USPQ 426 (CCPA 1977). See also *In re May,* 574 F.2d 1082, 197 USPQ 601 (CCPA 1978) (stereoisomers *prima facie* obvious)." (See MPEP 2144.09, Paragraph II).

Therefore, the organic spacer group, the methylene group which is located between the pyrrole ring and the SH group comprising (CH 2)n, wherein n is equal to 2-10 , is functionally equivalent to the compounds taught by Livache et al. It would have been *prima facie* obvious to

an ordinary practitioner to combine and substitute a method, wherein the organic spacer group, the methylene group which is located between the pyrrole ring and the SH group comprising (CH 2)n, wherein n is equal to 2-10 , which is functionally equivalent to the compounds taught by Livache et al. in the method of Teoule et al., since Livache et al. state, "Covalent linkage can be obtained by polymerization of modified pyrrole; thus small molecules have been immobilized by this method in polypyrrole films for electrochemical studies (Page 2915, Column 2, lines 11-13)." An ordinary practitioner would have been motivated to combine and substitute a method, wherein the organic spacer group, the methylene group which is located between the pyrrole ring and the SH group comprising (CH 2)n, wherein n is equal to 2-10 , which is functionally equivalent to the compounds taught by Livache et al. in the method of Teoule et al. in order to achieve the express advantages noted by Livache et al. of a method , which provides covalent linkage that can be obtained by polymerization of modified pyrrole; thus immobilizing small molecules in polypyrrole films for electrochemical studies.

7. Claims 1-5, 9-14, 16-17, 19, 20, and 24-26 are rejected under 35 U.S.C. 103(a) over Teoule et al. (U.S. Patent 5,837,859) (November 17, 1998) in view of Simon et al. (Journal of American Chemical Society, (1982), Vol. 104, pages 2031-2034).

Teoule et al teach the method of claims 1-5, 10-14, 16-17, 19, 20, and 24-26 as described above.

Teoule et al do not teach the method, wherein the sialanisation agent is N-(3-(trimethoxy silyl) propyl) pyrrole.

Simon et al. teach the method, wherein the sialanisation agent is N-(3-(trimethoxy silyl) propyl) pyrrole. (Page 2031, last 10 lines).

It would have been *prima facie* obvious to an ordinary practitioner to combine and substitute a method, wherein the sialanisation agent is N-(3-(trimethoxy silyl) propyl) pyrrole as taught by Simon et al. in the method of Teoule et al., since Simon et al. state, "We now report the synthesis, characterization, and application of N-(3-(trimethoxy silyl) propyl) pyrrole, I, as a photoanode deactivating reagent that can be covalently anchored to the electrode via reaction of surface OH groups. The pendant pyrrole functionality can then be used as the initiation site for polymerization of pyrrole, thereby serving to covalently anchor the polypyrrole (Page 2031, last 10 lines)." An ordinary practitioner would have been motivated to combine and substitute a method, wherein the sialanisation agent is N-(3-(trimethoxy silyl) propyl) pyrrole as taught by Simon et al. in the method of Teoule et al. in order to achieve the express advantages noted by Simon et al. of application of N-(3-(trimethoxy silyl) propyl) pyrrole, I, as a photoanode deactivating reagent that can be covalently anchored to the electrode via reaction of surface OH groups, which in turn can then be used as the initiation site for polymerization of pyrrole, thereby serving to covalently anchor the polypyrrole.

8. Claims 1-5, 10-17, 19, 20, and 24-26 are rejected under 35 U.S.C. 103(a) over Teoule et al. (U.S. Patent 5,837,859) (November 17, 1998) in view of Lizardi et al. (U.S. Patent 6,316,229 B1) (November 13, 2001).

Teoule et al teach the method of claims 1-5, 10-14, 16-17, 19, 20, and 24-26 as described above.

Teoule et al do not teach the method, wherein the cross-linking agent is glutaraldehyde.

Lizardi et al. teach the method, wherein the cross-linking agent is glutaraldehyde (Column 33, line 66 to column 34, line 20).

It would have been *prima facie* obvious to an ordinary practitioner to combine and substitute a cross-linking agent glutaraldehyde as taught by Lizardi et al. in the method of Teoule et al., since Lizardi et al. state, "A preferred attachment agent is glutaraldehyde (Column 33, line 66)." Lizardi et al further provide motivation as Lizardi et al. state,"For example, antibodies may be chemically cross-linked to a substrate that contains free amino or carboxyl groups using glutaraldehyde or carbodiimides as cross-linker agents (Column 34, lines 10-13)". An ordinary practitioner would have been motivated to combine and substitute a cross-linking agent glutaraldehyde as taught by Lizardi et al. in the method of Teoule et al., in order to achieve the express advantages noted by Lizardi et al. of preferred attachment agent glutaraldehyde, which provides chemical cross-linking of an antibody to a substrate that contains free amino or carboxyl groups.

9. Claims 1-5, 10-14, 16-20, and 24-26 are rejected under 35 U.S.C. 103(a) over Teoule et al. (U.S. Patent 5,837,859) (November 17, 1998) in view of Heroux et al. (U.S. Patent 6,312,896 B1) (November 6, 2001).

Teoule et al teach the method of claims 1-5, 10-14, 16-17, 19, 20, and 24-26 as described above.

Teoule et al do not teach the method, wherein the oligonucleotide is functionalized with a thiol group.

Heroux et al. teach the method, wherein the oligonucleotide is functionalized with a thiol group (Column 12, lines 33-65).

It would have been *prima facie* obvious to an ordinary practitioner to combine and substitute the oligonucleotide functionalized with a thiol group as taught by Heroux et al. in the method of Teoule et al., since Heroux et al. state, "By using standard coupling chemistries known in the art, it is possible to conveniently label/immobilize the natural substrate of an enzyme (the cost, labor, and uncertainty of using unnatural or synthetic substrates can be avoided). Control over the sites of labeling/immobilization can be achieved by using coupling chemistries specific for a particular functionality on a substrate (e.g., an oligonucleotide that is 5'-modified with an amino group and 3'-modified with a thiol group can be specifically labeled at the 5'-positions with the NHS ester of biotin, and specifically labeled at the 3' position with a maleimide derivative of Ru Bpy (Column 12, lines 54-65)." An ordinary practitioner would have been motivated to combine and substitute the oligonucleotide functionalized with a thiol group as taught by Heroux et al. in the method of Teoule et al., in order to achieve the express advantages noted by Heroux et al. of gaining control over the sites of labeling/immobilization by using

coupling chemistries specific for a particular functionality on a substrate and avoiding the cost, labor, and uncertainty of using unnatural or synthetic substrates.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arun Chakrabarti , Ph. D., whose telephone number is (703) 306-5818. The examiner can normally be reached on 7:00 AM-4:30 PM from Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Jones, can be reached on (703) 308-1152. The fax phone number for this Group is (703) 305-7401.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0196.

Arun kr. Chakrabarti

Arun Chakrabarti,

Patent Examiner

November 27, 2001

W. Gary Jones
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